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# **STRATEGIES FOR ENHANCING THE LEARNING OUTCOMES FOR WEB-BASED DISTANCE EDUCATION STUDENTS: FURTHER INVESTIGATION OF THE RELATIONSHIPS BETWEEN MOTIVATION AND LEARNING OUTCOMES**

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## **ABSTRACT**

In our earlier study, we examined the determinants of students' satisfaction and their perceived learning outcomes in the context of university online courses. Independent variables included in the study are course structure, instructor feedback, self-motivation, learning style, interaction, and instructor facilitation as potential determinants of online learning. Using the structural equation modeling software (PLS Graph), we found that course structure, instructor feedback, self-motivation, learning styles, interaction, and instructor facilitation significantly affect student satisfaction. Nevertheless, of these six antecedent variables, instructor feedback and student learning styles are only two constructs that significantly affect the perceived learning outcomes of e-learning students.

We propose a research model of e-learning motivation to answer one of the three disputable research findings: specifying the conditions under which self-motivation is likely to have positive, negative, or neutral effect on perceived learning outcomes

**Keywords:** Distance Education/Distance Learning, Intrinsic Motivation, Extrinsic Motivation, Learning Effectiveness, User-Satisfaction, Perceived Learning Outcomes, Structural Equation Modeling.

## **I. INTRODUCTION**

Online programs have now become a viable educational delivery medium. Millions of students are now taking online courses [Carnevale, 2005]. One of the

core subjects in the study of e-learning systems is the management of the determinants of learning outcomes. What are factors that determine the outcomes of e-Learning systems? How should we manage the critical factors to make distance learning effective? Using the structural equation modeling software (PLS Graph), we found that course structure, instructor feedback, self-motivation, learning styles, interaction, and instructor facilitation significantly affect student satisfaction. Nevertheless, of these six antecedent variables, instructor feedback and student learning styles are only two constructs that significantly affect the perceived learning outcomes of e-learning students[Eom et al., 2006].

The current study further investigates the relationship between motivation and e-learning outcomes, one disputable finding of our earlier study. It aims to better specify the conditions under which self-motivation is likely to have a positive, negative, or neutral effect on perceived learning outcomes. To clarify the dispute over the issue, the current study uses more sophisticated measures of self-motivation and their engagement in learning activities using multi-level hierarchical modeling. In our previous study, the learning outcome variables ask students about whether they perceive the quality of online learning to be better than that of face-to-face courses or whether students learned more in one than the other. Although students are in general satisfied with online courses, they believe that they did not learn more in online courses or they believe that the quality of online courses was not better than face-to-face courses.

The rest of the paper is organized as follows. Section 2 reviews the important factors that contribute to the success of e-learning systems such as student self-motivation, learning styles, instructor's knowledge and facilitation, instructor feedback, interaction, and course structure. Section 3 summarizes the results of our previous research as a basis of the proposed research model which aims to answer one of the three disputable research findings. Section 4 examines the concepts of motivations and the relationships between motivation and e-learning outcomes. The new research model of e-learning motivation is presented. Finally, we outline the planned methodology.

## **II. THE DETERMINANTS OF OUTCOMES OF E-LEARNING SYSTEMS**

The distance learning system can be viewed as having several human/non-human entities interacting together via computer-based instructional systems to achieve the goals of education, including learning outcomes and student satisfaction. These two goals are widely cited as measures of the effectiveness of online education systems e.g., [Alavi et al., 1995, Graham and Scarborough, 2001].

### **HUMAN FACTORS**

Piccoli, Ahmad and Ives [2001] refer to human and design factors as antecedents of learning effectiveness. Human factors are concerned with students and instructors, while design factors characterize such variables as technology, learner control, course content, and interaction. The conceptual framework of online education proposed by Peltier, Drago and Schibrowsky [2003] consists of instructor support and mentoring, instructor-to-student interaction, student-to-student interaction, course structure, course content, and information delivery technology.

### **Student Self-Motivation**

A different learning strategy, self-regulated learning, is necessary for e-learning systems to be effective. Self-regulated learning requires changing roles of students from passive learners to active learners. Learners must self-manage the learning process. The core of self-regulated learning is self-motivation [Smith, 2001]. Web-based e-learning systems placed more responsibilities on learners

than traditional face-to-face learning systems. Self-motivation is defined as the self-generated energy that gives behavior direction toward a particular goal [Zimmerman, 1985, Zimmerman, 1994].

### **Students' Learning Style**

Due to the multiples dimensions of differences in each learner, there have been continuing research interests in learning styles. Some 21 models of learning styles are cited in the literature [Curry, 1983] including the following six prominent learning style models. See [Hawk and Shah, 2007] for an excellent review of these models.

- Kolb experiential learning model [Kolb, 1984]
- Gregorc learning style model [Butler, 1986, Gregorc and Ward, 1977]
- The VARK model[Fleming, 2001]
- Felder-Silverman Learning/Teaching style model [Felder and Silverman, 1988]
- Dunn and Dunn learning style model[Dunn and Dunn, 1989, Dunn et al., 1982]
- RASI (The Revised Approaches to Studying Inventory) model [Entwistle et al., 1979, Entwistle and Tait, 1995]

The basic premise of learning style research is that different students learn differently and students experience higher level of satisfaction and learning outcomes when there is a fit between a learner's learning style and a teaching style.

### **Instructor Knowledge and Facilitation**

Traditional face-to-face classes using the primarily lecture method use the objectivist model of learning, whose goal is transfer of knowledge from instructors to students. Even in distance learning it is still a critical role of the instructor to

transfer his or her knowledge to students, because the knowledge of instructors is transmitted to students at different location [Leidner and Jarvenpaa, 1995].

Distance learning can easily break a major assumption of objectivism instructor houses all necessary knowledge. For this reason, distance learning systems can utilize many other learning models such as constructivist, collaboratism, and socioculturism. Constructivism assumes that individuals learn better when they control the pace of learning [Leidner and Jarvenpaa, 1995]. Therefore, the instructor supports learner-centered active learning. Under the model of collaboratism, student involvement is critical to learning. The basic premise of this model of collaboratism is that students learn through shared understanding of a group of learners. Therefore, instruction becomes communication-oriented and the instructor becomes discussion leader. Distance learning facilities promote collaborative learning across distances with facilities to enable students to communicate each other. Socioculturism model necessitates empowering students with freedom and responsibilities since learning is individualistic.

### **Instructor Feedback**

Instructor feedback intends to improve student performance via informing students how well they are doing and via directing students' learning efforts. Instructor feedback in the Web-based system includes the simplest cognitive feedback (e.g., exam/assignment with his or her answer marked wrong), diagnostic feedback (e.g., exam/assignment with instructor comments about why the answers are correct or incorrect), prescriptive feedback (instructor feedback suggesting how the correct responses can be constructed) via replies to student e-mails, graded work with comments, online grade books, and synchronous and asynchronous commentary, etc.

Instructor feedback to students can improve learner affective responses, increase cognitive skills and knowledge, and activate metacognition. Metacognition refers to the awareness and control of cognition through planning, monitoring, and regulating cognitive activities [Pintrich et al., 1991].

Metacognitive feedback concerning learner progress directs the learner's attention to learning outcomes [Ley, 1999]. When metacognition is activated, students may become self-regulated learners. They can set specific learning outcomes and monitor the effectiveness of their learning methods or strategies.[Chen, 2002, Zimmerman, 1989].

## **DESIGN FACTORS**

The design dimension includes a wide range of constructs that affect effectiveness of e-learning systems such as technology, learner control, learning model, course contents and structure, and interaction.

### **Interaction**

Among the many frameworks/taxonomies of interaction [Northrup, 2002], this research adopts Moore's [1989] communication framework which classified engagement in learning through (a) interaction between participants and learning materials, (b) interaction between participants and tutors/experts, and (c) interactions among participants. These three forms of interaction in online courses are recognized as important and critical constructs determining the performance of web-based course quality. Most students who reported higher levels of interaction with instructor, and peers reported higher levels of satisfaction and higher levels of learning e.g., [Swan, 2001]. A number of previous research suggested that an interactive teaching style and high levels of learner-to-instructor interaction is strongly associated with high levels of user satisfaction and learning outcomes [Arbaugh, 2000, Swan, 2001].

Swan [Swan, 2001, p.317] reported student perceptions of interaction with their peers to be related to four components: actual interactions in the courses, the percentage of the course grade that was based on discussion, required participation in discussions, and the average length of discussion responses. Graham and Scarborough bolstered Swan's findings as their survey determined that 64% of students claimed that having access to a group of students was

important [Graham and Scarborough, 2001, p.238]. Furthermore, Picciano [1998] discovered that students perceive learning from online courses to be related to the amount of discussion actually taking place in them. When students actively participate in an intellectual exchange with fellow students and the instructor, students verbalize what they are learning in a course and articulate their current understanding [Chi and VanLehn, 1991].

### **Course Structure**

Course structure is seen as a crucial variable that affects the success of distance education along interaction. According to Moore [1991, p.3], the course structure “expresses the rigidity or flexibility of the program's educational objectives, teaching strategies, and evaluation methods” and the course structure describes “the extent to which an education program can accommodate or be responsive to each learner's individual needs.”

Course structure has two structural elements-- course objectives/expectation and course infrastructure. Course objectives/expectation are to be specified in the course syllabus including what topical coverage are to be learned, required workload in competing assignments, expected class participation in the form of online conferencing systems, group project assignments, etc. Course infrastructure is concerned with the overall usability of course website and organization of course material into logical and understandable components. These structural elements, needless to say, affect the satisfaction level and learning outcomes of distance learners.

## **III. FINDINGS OF OUR PREVIOUS RESEARCH**

The research model was tested using the sem-based partial least squares (PLSs) methodology. The six sets of hypotheses were tested using a quantitative survey of satisfaction and learning outcome perceptions of students who have taken at least one online course at a large Midwestern university in the United



States. Overall, the revised measurement model results provided support for the reliability, and convergent and discriminant validities of the measures used in the previous study.

All of the antecedent constructs hypothesized to affect user satisfaction were significant suggesting that course structure, instructor feedback, self-motivation, personality/learning style, interaction and instructor affect the perceived satisfaction of students who took Web-based courses. Of the same six factors hypothesized to affect the learning outcomes construct, only two were supported at  $p < 0.05$ . These were instructor feedback and personality/learning style. The findings suggest online education can be a superior mode of instruction if it is targeted to learners with specific learning styles (visual and read/write learning styles), and with timely, meaningful instructor feedback of various types. The structural model results also revealed that user satisfaction is a significant predictor of learning outcomes.

#### **IV. FURTHER INVESTIGATION: SELF-MOTIVATION AND PERCEIVED LEARNING OUTCOMES**

Contrary to other research findings[Frankola, 2001, LaRose and Whitten, 2000], no significant relationships were found between students' self-motivation and perceived learning outcomes. Theoretically, self-motivation can lead students to go beyond the scope and requirements of an educational course because they are seeking to learn about the subject, not just fulfill a limited set of requirements. Self-motivation should also encourage learning even when there is little or no external reinforcement to learn and even in the face of obstacles and setbacks to learning. In this paper, we further investigate the relationship between motivation and perceived learning outcomes.

## **MOTIVATIONAL CONCEPTS**

Motivation is incentive that provides a person with motives to direct his/her behavior toward a particular goal. That motive can take the form of intrinsic and extrinsic motivation. Intrinsic motivation comes from inside of a person who performs a task, while extrinsic motivation originates from outside of the performer.

### **Intrinsic motivation**

There are many motivational theories that may be useful for understanding the learner's motivation. According to the achievement motivation theory [McClelland et al., 1953], all humans have three main needs for achievement, power, and affiliation. But each of us has a different degree of intensity or amount for each type of needs. Maslow's hierarchy of needs theory [Maslow, 1943] describes that the hierarchy of needs is often depicted as a pyramid consisting of five levels from basic to the most complex and higher: physiological, safety and security, social, esteem, and self actualization. This theory posits that human beings try to satisfy the lower level of needs starting physiological. Once these are met, the higher needs in this hierarchy will be focused on. According to the two factor theory [Herzberg, 1966, Herzberg et al., 1959], some motives in organizations can be stronger factors that give positive satisfactions while some factors (hygiene factors) do not motivate employee but only de-motivate them if absent.

## **THE DETERMINANTS OF MOTIVATION TO LEARN**

Motivation can lead to improved learning outcomes by directing learner's behavior toward particular learning goals and objectives and helping learners be persistent in learning activities. The extant literature suggests that students with strong motivation will be more successful and tend to learn the most in web-based courses than those with less motivation [Frankola, 2001, LaRose and

Whitten, 2000]. Students' motivation is a major factor that affects the attrition and completion rates in the web-based course and a lack of motivation is also linked to high dropout rates [Frankola, 2001, Galusha, 1997]. One of the stark contrasts between successful students is their apparent ability to motivate themselves, even when they do not have the burning desire to complete a certain task. On the other hand, less successful students tend to have difficulty in calling up self- motivation skills such as goal setting, verbal reinforcement, self-rewards, and punishment control techniques [Dembo and Eaton, 2000].

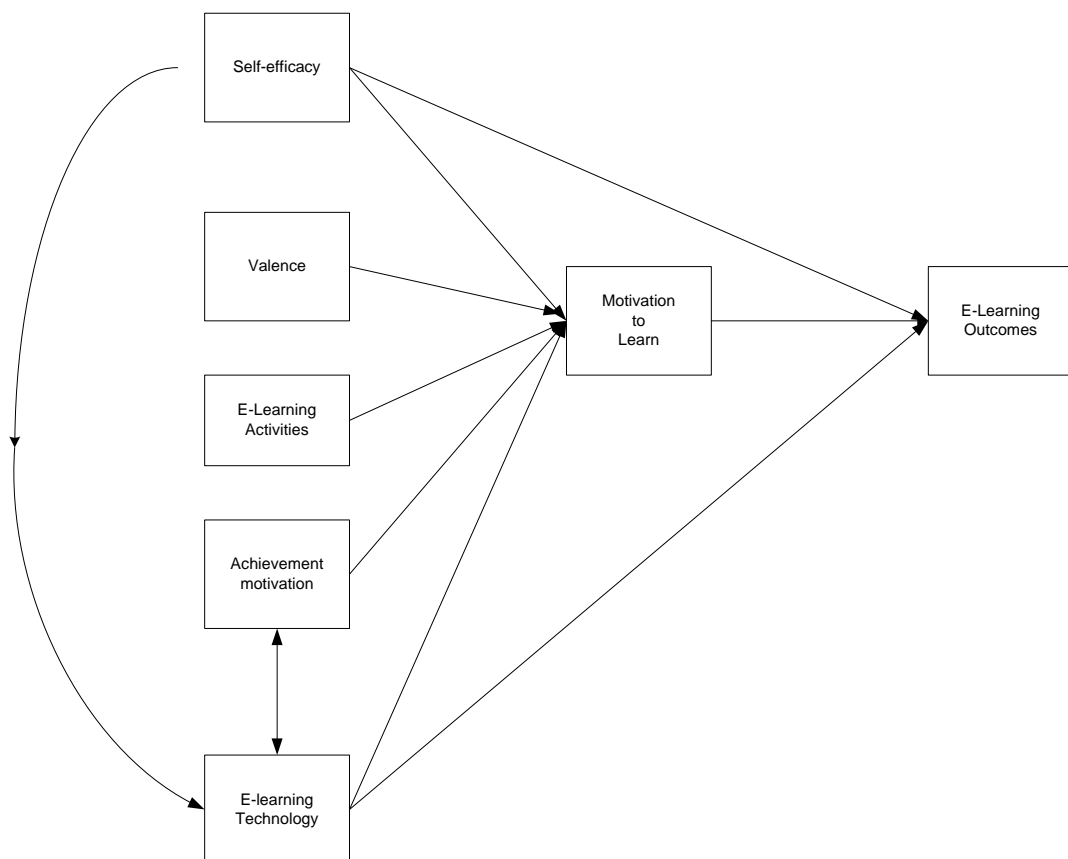


Figure 1. Research Model of E-Learning Motivation

Motivation to learn is found to be a strong predictor of learning outcomes [Colquitt et al., 2000, Noe, 1986, Tannenbaum and Yukl, 1992]. Motivation to

learn is only a factor that needs to be carefully studied along with some other constructs shown in figure 1. These constructs have been studied widely in the training area and the research in the training area showed that there were positive relationships between self-efficacy, motivation to learn, and learning outcomes [Gist et al., 1991, Martocchio and Webster, 1992, Mathieu et al., 1992, Quinones, 1995, Stajkovic and Luthans, 1998].

The strength of the learner's self-motivation to learn is influenced by self-regulatory attributes and self-regulatory processes. The self-regulatory attributes are the learner's personal learning characteristics including self-efficacy. Self-efficacy refers to an individual's "belief in one's capabilities to organize and execute the courses of action required to produce given attainments"[Bandura, 1997, p.3]. Self-efficacy influences choice, efforts, and volition [Schunk, 1991].

Valence refers to "individual's beliefs regarding the desirability of outcomes"[Colquitt et al., 2000, p.680] obtained from learning/training. Prior research showed that the strength of the learner's self-motivation is positively related to the positive individual beliefs on the desirability of outcomes [Colquitt and Simmering, 1998, Mathieu et al., 1992]. When the learners are allowed exercise personal control over their fate and environment, intrinsic motivation and self-determination are likely to increase [Lepper and Chabay, 1985]. Further they are more likely to continue to engage in the educational program. When individuals are permitted to work at their own pace, intrinsic motivation will probably increase [Whitehill and McDonald, 1993].

Characteristics of e-learning activities also positively influence intrinsic motivation [Lepper, 1988]. E-learning activities are intrinsically motivating if they:

- provide a challenge to the participants [Shroff et al., 2007].
- involve learning process to master information that is at least of intermediate difficulties. Learning how to solve the difficult problems may quite possibly bring about feelings of self-efficacy and enhanced levels of intrinsic motivation [Deng et al., 2004].
- stimulate curiosity due to the newness of the problems and moderate complexity [Kashdan and Fincham, 2004, Rieber, 1991].

These task characteristics (challenging, new, and moderately complex) stimulate and increase the degree of intrinsic motivation of learners. This, in turn, affects the learner's information processing and decision making strategies to deal with complex intellectual tasks. Intrinsically motivated learners are found to employ strategies that demand more efforts and that enables them to process information more deeply [Lepper and Malone, 1987]. They use more logical information processing and decision making strategies than their counterparts who are extrinsically oriented [Condry and Chambers, 1978].

E-learning technology plays an important role on the intrinsic motivation of e-learners [Keller and Sujuki, 2004]. E-learning Students' intrinsic motivation may be affected by "a pedagogically driven portfolio of learning activities supported by well-selected and integrated audio, video, and data technologies"[Shroff et al., 2007].

## **V. OVERVIEW OF THE PLANNED METHODOLOGY**

The research model will be tested using a quantitative survey of satisfaction and learning outcomes perception of students who have taken at least one web-based course. Structural equation modeling is to be employed to examine the relationships among learning outcomes, motivation to learn, and self-efficacy, valence, achievement motivation and E-learning technology. Due to the changes in research design, the survey instrument used in the previous research will be modified to accommodate the introduction of new constructs.

We expect that the results of this research in progress will provide valuable information and guidelines to motivate online students to maximize the benefits of distant education. As shown in the review of the literature, most of the constructs in the revised model have been extensively researched in the education field. But, the large portion of the reviewed research is based on the face-to-face classes. It will be interesting to see whether the prior findings can be

applicable to e-learning systems. Our research in progress intends to test the proposed model (figure 1) to build an integrative theory of e-learning effectiveness. Specifically, we focus on specifying the conditions under which self-motivation is likely to have positive, negative, or neutral effect on perceived learning outcomes.

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